

Claims

What is claimed is:

1. A temperature monitoring device for use with a cryo therapy apparatus, comprising:

a cryo therapy apparatus;

a tubular member coupled to the cryo therapy apparatus; and

a temperature monitoring member coupled to the tubular member.

2. The temperature monitoring device according to claim 1, wherein the temperature monitoring member is coupled to the cryo therapy apparatus in a quartet array.

3. The temperature monitoring device according to claim 1, wherein the temperature monitoring member is coupled to the cryo therapy apparatus in a octet array.

4. The temperature monitoring device according to claim 1, wherein the temperature monitoring member is coupled to the cryo therapy apparatus in a circular array.

5. The temperature monitoring device according to claim 1, wherein the tubular member further comprises a proximal end, a distal end, and a lumen extending therethrough.

6. The temperature monitoring device according to claim 5, wherein the temperature monitoring member comprises a retractable needle slidably disposed within the lumen of the tubular member.

7. The temperature monitoring device according to claim 6, wherein the retractable needle further comprises a marker band.

8. The temperature monitoring device according to claim 1, wherein the temperature monitoring member comprises an infrared sensor.

9. The temperature monitoring device according to claim 1, wherein the temperature monitoring member comprises an ultrasound transmitter.

10. The temperature monitoring device according to claim 1, wherein the temperature monitoring member comprises an expandable stent having a plurality of thermal spikes.

11. The temperature monitoring device according to claim 11, wherein the stent comprises nickel-titanium alloy.

12. A temperature monitoring device for use with a cryo therapy apparatus, comprising:

a cryo therapy apparatus;

a plurality of tubular members coupled to the cryo therapy apparatus, the tubular members each coupled to a temperature monitoring member and arranged in an array;
and

wherein the temperature monitoring member can measure the temperature at an area of interest while the cryoplasty device cools the area of interest.

13. The temperature monitoring device according to claim 12, wherein the tubular member further comprises a proximal end, a distal end, and a lumen extending therethrough.

14. The temperature monitoring device according to claim 13, wherein the temperature monitoring member comprises a retractable needle slidably disposed within the lumen of the tubular member.

15. The temperature monitoring device according to claim 14, wherein the retractable needle further comprises a marker band.

16. The temperature monitoring device according to claim 12, wherein the temperature monitoring member comprises an infrared sensor.

17. The temperature monitoring device according to claim 12, wherein the temperature monitoring member comprises an ultrasound transmitter.

18. The temperature monitoring device according to claim 12, wherein the temperature monitoring members are arranged in a quartet array.

19. The temperature monitoring device according to claim 12, wherein the temperature monitoring members are arranged in an octet array.

20. The temperature monitoring device according to claim 12, wherein the temperature monitoring members are arranged in a circular array.

21. The temperature monitoring device according to claim 12, wherein the temperature monitoring member is an expandable stent having a plurality of thermal spikes.

22. The temperature monitoring device according to claim 21, wherein the stent comprises nickel-titanium alloy.

23. A method of monitoring the temperature of an area of interest during a cryoplasty procedure, comprising the steps of:

providing a temperature monitoring device including a cryo therapy apparatus, a tubular member coupled to the cryo therapy apparatus, the tubular member including a temperature monitoring member;

advancing the temperature monitoring device to an area of interest;

cooling the area of interest with the cryo therapy apparatus; and

measuring temperature at the area of interest with the temperature monitoring member.

24. The method according to claim 23, wherein the tubular member further comprises a proximal end, a distal end, and a lumen extending therethrough.

25. The method according to claim 24, wherein the temperature monitoring member comprises a retractable needle slidably disposed within the lumen of tubular member.

26. The method according to claim 25, wherein the retractable needle further comprises a marker band.

27. The method according to claim 26, wherein the step of measuring temperature with the temperature monitoring member includes penetrating the area of interest with the retractable needle.

28. The method according to claim 23, wherein the temperature monitoring member comprises an infrared sensor.

29. The method according to claim 28, wherein the step of measuring temperature with the temperature monitoring member includes detecting infrared energy at the area of interest.

30. The method according to claim 23, wherein the temperature monitoring member comprises an ultrasound transmitter.

31. The method according to claim 30, wherein the step of measuring temperature with the temperature monitoring member includes irradiating the area of interest with ultrasound energy.

32. The method according to claim 23, wherein the temperature monitoring member an expandable stent having a plurality of thermal spikes.

33. The method according to claim 32, wherein the step of measuring temperature with the temperature monitoring member includes penetrating the area of interest with the thermal spike.

34. The method according to claim 32, wherein the stent comprises nickel-titanium alloy.

35. A temperature monitoring device for use with a cryo therapy apparatus, comprising:

a cryo therapy apparatus;

a tubular member coupled to the cryo therapy apparatus; and

a temperature monitoring member coupled to the tubular member, the temperature monitoring member having a length extending from the cryo therapy apparatus along a longitudinal axis and a width; and

wherein the length of the temperature monitoring member extending away from the cryo therapy apparatus along the longitudinal axis is larger than the width.

36. The temperature monitoring device in accordance with claim 35, wherein the temperature monitoring member extends from the cryo therapy apparatus at an angle.

37. The temperature monitoring device in accordance with claim 36, wherein the angle is about 90° .

38. The temperature monitoring device in accordance with claim 36, wherein the angle is acute.

39. The temperature monitoring device in accordance with claim 36, wherein the angle is obtuse.

40. A temperature monitoring device for use with a cryo therapy apparatus, comprising:

a cryo therapy apparatus; and

a temperature monitoring member coupled to the cryo therapy apparatus, wherein at least a portion of the temperature monitoring member is disposed within the cryo therapy apparatus.

41. A temperature monitoring device for use with a cryo therapy apparatus, comprising:

- an elongate shaft having a distal end;
- a cooling chamber disposed that the distal end of the shaft;
- a temperature monitoring member coupled to the shaft, wherein at least a portion of the temperature monitoring member is disposed within the cooling chamber.

42. The temperature monitoring device in accordance with claim 41, wherein the cooling chamber includes an outer cooling chamber and an inner cooling chamber.